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SAFETY

Operation and Maintenance
Manual Excerpt

Operation and Maintenance Manual

416C, 426C, 428C, 436C and 438C Backhoe Loaders

5YN16590-Up (Machine)
7WN1100-Up (Machine)
8RN4990-Up (Machine)
9JN1050-Up (Machine)
9KN1400-Up (Machine)
1ER900-Up (Machine)
1GR950-Up (Machine)
1JR1150-Up (Machine)
1NR1050-Up (Machine)
1RR1100-Up (Machine)
1TR1850-Up (Machine)
1XR2250-Up (Machine)
1ZR1000-Up (Machine)
2BR1000-Up (Machine)
2CR19310-Up (Machine)
2DR3450-Up (Machine)

Important Safety Information

Most accidents that involve product operation, maintenance and repair are caused by failure to observe basic safety rules or precautions. An accident can often be avoided by recognizing potentially hazardous situations before an accident occurs. A person must be alert to potential hazards. This person should also have the necessary training, skills and tools to perform these functions properly.

Improper operation, lubrication, maintenance or repair of this product can be dangerous and could result in injury or death.

Do not operate or perform any lubrication, maintenance or repair on this product, until you have read and understood the operation, lubrication, maintenance and repair information.

Safety precautions and warnings are provided in this manual and on the product. If these hazard warnings are not heeded, bodily injury or death could occur to you or to other persons.

The hazards are identified by the "Safety Alert Symbol" and followed by a "Signal Word" such as "DANGER", "WARNING" or "CAUTION". The Safety Alert "WARNING" label is shown below.



The meaning of this safety alert symbol is as follows:

Attention! Become Alert! Your Safety is Involved.

The message that appears under the warning explains the hazard and can be either written or pictorially presented.

Operations that may cause product damage are identified by "NOTICE" labels on the product and in this publication.

Caterpillar cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this publication and on the product are, therefore, not all inclusive. If a tool, procedure, work method or operating technique that is not specifically recommended by Caterpillar is used, you must satisfy yourself that it is safe for you and for others. You should also ensure that the product will not be damaged or be made unsafe by the operation, lubrication, maintenance or repair procedures that you choose.

The information, specifications, and illustrations in this publication are on the basis of information that was available at the time that the publication was written. The specifications, torques, pressures, measurements, adjustments, illustrations, and other items can change at any time. These changes can affect the service that is given to the product. Obtain the complete and most current information before you start any job. Caterpillar dealers have the most current information available. For a list of the most current publication form numbers available, see the Service Manual Contents Microfiche, REG1139F.



When replacement parts are required for this product Caterpillar recommends using Caterpillar replacement parts or parts with equivalent specifications including, but not limited to, physical dimensions, type, strength and material.

Failure to heed this warning can lead to premature failures, product damage, personal injury or death.

Safety Section

Safety Signs and Labels

i01124757

SMCS Code: 7000; 7405

There are several specific warning signs on this machine. The exact location of the hazards and the description of the hazards are reviewed in this section. Please become familiarized with all warning signs.

Make sure that all of the warning signs are legible. Clean the warning signs or replace the warning signs if you cannot read the words. Replace the illustrations if the illustrations are not legible. When you clean the warning signs, use a cloth, water and soap. Do not use solvent, gasoline, or other harsh chemicals to clean the safety signs. Solvents, gasoline, or harsh chemicals could loosen the adhesive that secures the warning sign. Loose adhesive will allow the warning sign to fall.

Replace any safety sign that is damaged, or missing. If a safety sign is attached to a part that is replaced, install a safety sign on the replacement part. Any Caterpillar dealer can provide new safety signs.

Do Not Operate



Illustration 2

g00506036

This warning label is located on the front console above the steering wheel.

WARNING

Do not operate or work on this machine unless you have read and understand the instructions and warnings in the Operation and Maintenance Manuals. Failure to follow the instructions or heed the warnings could result in injury or death. Contact your Caterpillar dealer for replacement manuals. Proper care is your responsibility.

Improper Attachment of Implements

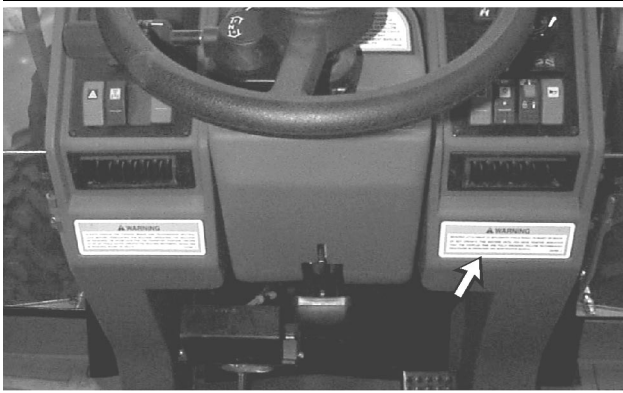


Illustration 3

g00505958

This warning label is located on the right side of the front console.

WARNING

Improper attachment of implements could result in injury or death.

Do not operate this machine until you have positive indication that the coupler pins are fully engaged. Follow recommended procedure in Operation and Maintenance Manual.

Parking Brake and Transmission Neutral Lock



Illustration 4

g00506033

This warning label is located on the left side of the front console.

WARNING

Always engage the parking brake and transmission neutral lock before dismounting the machine, operating the backhoe or engaging the boom lock for the transport position. Failure to do so could allow unexpected machine movement, resulting in personal injury or death.

ROPS



Illustration 5

g00289948

This warning label is located on the outside of the cab.

WARNING

Structural damage, an overturn, modification, alteration, or improper repair can impair this structure's protection capability thereby voiding this certification. Do not weld on or drill holes in the structure. Consult a Caterpillar dealer to determine this structure's limitations without voiding its certification.

Stay Clear

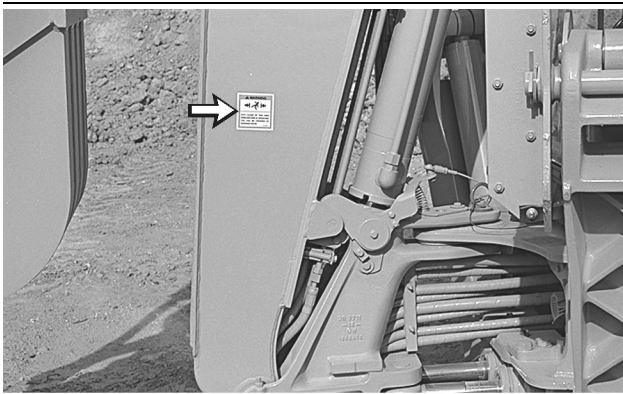


Illustration 6

g00289949

This warning label is located on both sides of the boom.

WARNING

Stay clear of this area when machine is operating. You can be crushed by swinging boom.

Pressurized System

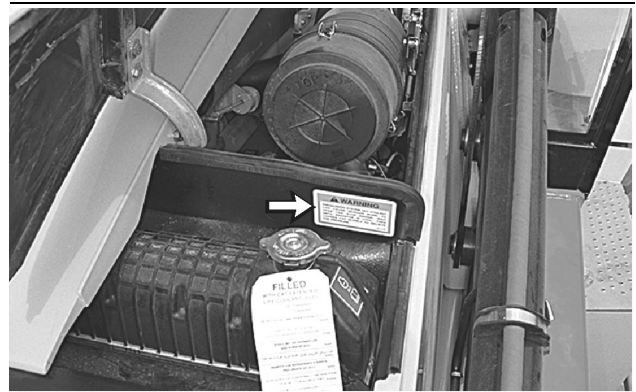


Illustration 7

g00289950

This warning label is located by the cooling system filler cap.

WARNING

Pressurized system: Hot coolant can cause serious burn. To open cap, stop engine, wait until radiator is cool. Then loosen cap slowly to relieve the pressure.

Batteries



Illustration 8

g00289951

This warning label is located on the inside of the door for the battery compartment.

WARNING

Improper jumper cable connections can cause explosion resulting in personal injury. Batteries may be located in separate compartments, always connect positive (+) cable to positive (+) terminal of battery connected to starter solenoid and negative (-) cable from external source to engine block or frame.

Battery



Illustration 9

g00289952

This warning label is located on the top of the batteries.

WARNING

DANGER/POISON

Shield eyes, Explosive gases. Can cause blindness or injury.

No sparks, flames or smoking.

Sulfuric Acid can cause blindness or severe burns.

FLUSH EYES IMMEDIATELY WITH WATER. Get medical help fast.

Keep out of reach of children. Contains sulfuric acid. For medical emergency in USA or Canada contact: 800-458-5924, other countries contact: 303-893-1322.

Brace the Lift Cylinder on Parallel Lift Machines



Illustration 10

g00289953

This warning label is located on the loader lift arm by the loader lift arm brace.

WARNING

When performing any work underneath a raised loader lift arm, the loader lift arm brace must be in place. Install the loader lift arm brace as follows.

1. Empty loader bucket. Remove pin that secures loader lift arm brace to left loader arm. Raise loader arms to maximum height with the bucket in the dump position.
2. Position service brace over left lift cylinder with flat end against cylinder end.
3. Push pin through holes of loader lift arm brace and install cotter pin.
4. Slowly lower loader arms until brace contacts the top of the lift cylinder and bosses on loader arm.
5. To remove loader lift arm brace, reverse procedure.

Failure to follow this procedure can result in death or serious injury if the loader arms are accidentally lowered.

Brace Lift Cylinder on Single Tilt Machines



Illustration 11

g00289954

This warning label is located on the loader lift arm by the loader lift arm brace.

WARNING

When performing any work underneath a raised loader lift arm, the loader lift arm brace must be in place. Install the loader lift arm brace as follows.

1. Empty loader bucket, raise loader arms to maximum height with the bucket in the dump position.
2. Remove cotter pin from brace retaining pin and lower brace down over lift cylinder rod. Install retaining pin through lower holes of the service brace and install cotter pin in retaining pin.
3. Slowly lower loader arms until brace contacts the top of the lift cylinder and bosses on loader arm.
4. To remove loader lift arm brace, reverse procedure.

Failure to follow this procedure can result in death or serious injury if the loader arms are accidentally lowered.

Extendable Stick



Illustration 12

g00289955

This warning label is located by the connectors for the auxiliary hydraulic hoses.

WARNING

E-stick must be pinned before using attachments, to prevent movement which could cause personal injury.

Ether



Illustration 13

g00634757

This warning label is located on top of the storage compartment on the side console.

WARNING

Do not spray ether into engine when using thermal starting aid to start engine. Personal injury and machine damage could result. Follow procedure in the Operation and Maintenance Manual.

i00609983

General Hazard Information

SMCS Code: 7000

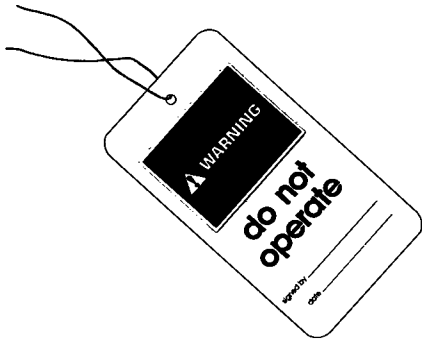


Illustration 14

g00037327

Before you service the machine or before you repair the machine, attach a “Do Not Operate” warning tag or a similar warning tag to the start switch or to the controls. These warning tags Special Instruction, SEHS7332 are available from your Caterpillar dealer.

Know the width of your equipment in order to maintain proper clearance near fences, boundary obstacles, etc.

Wear a hard hat, protective glasses and other protective equipment in order to accommodate job conditions.

Do not wear loose clothing or jewelry that can catch on controls or on other parts of the machine.

Ensure that all protective guards and all covers are secured in place on the machine.

Keep the machine free from foreign material. Check the deck, the walkways and the steps. Remove debris, oil, tools and other items.

Secure all loose items that are not a part of the machine. Secure lunch boxes, tools and other items.

Know the appropriate work site hand signals. Also, know the personnel that are authorized to give the hand signals. Accept signals from one person only.

Do not smoke when you service an air conditioner. Also, do not smoke if refrigerant gas may be present. Inhaling the fumes that are emitted from a flame that contacts air conditioner refrigerant can cause bodily harm or death. Inhaling gas from air conditioner refrigerant through a lighted cigarette can cause bodily harm or death.

Never put maintenance fluids into glass containers. Drain all liquids into a suitable container.

When you discard liquids, obey all local regulations.

Use all cleaning solutions with care.

Report all necessary repairs.

Do not allow unauthorized personnel on the machine.

Unless you are instructed otherwise, perform the maintenance with the following conditions:

- The machine is parked on level ground.
- The attachment controls are in HOLD position.
- The transmission control is in NEUTRAL position and the neutral lock is in the ON position.
- The parking brake is engaged.
- Lower the loader bucket until the loader bucket exerts a slight downward pressure onto the ground.
- The engine is stopped.
- The engine start switch in the OFF position and the key is removed.

Pressure Air

Pressure air can cause personal injury. When pressure air is used for cleaning, wear a protective face shield, protective clothing and protective shoes.

The maximum air pressure must be below 205 kPa (30 psi) for cleaning purposes.

Trapped Pressure

Pressure can be trapped in a hydraulic system. Trapped pressure can cause sudden machine movement or attachment movement. Use caution if you disconnect hydraulic lines or fittings. High pressure oil that is released can cause a hose to whip. High pressure oil that is released can cause oil to spray. Fluid penetration can cause serious injury and possible death.

Fluid Penetration

When you check for a leak, use a board or cardboard. Leaking fluid that is under pressure can penetrate body tissue. Fluid penetration can cause serious injury and possible death. A pin hole leak can cause severe injury. If fluid is injected into your skin, you must obtain treatment immediately. Seek treatment from a doctor that is familiar with this type of injury.

Asbestos Information

Caterpillar equipment and replacement parts that are shipped from Caterpillar are asbestos free. Caterpillar recommends the use of only genuine Caterpillar replacement parts. If any replacement parts that contain asbestos are used, the following guidelines should be used in handling these parts and asbestos debris.

Use caution. Avoid inhaling dust that might be generated when you handle components that contain asbestos fibers. If this dust is inhaled, it can be hazardous to your health. The components that may contain asbestos fibers are brake pads, brake bands, lining material, clutch plates, and some gaskets. The asbestos that is used in these components is usually bound in a resin or sealed in some way. Normal handling is not hazardous, unless airborne dust that contains asbestos is generated.

If dust which can contain asbestos is present, there are several guidelines that should be followed:

- Never use compressed air for cleaning.
- Avoid sweeping materials that contain asbestos.
- Also avoid grinding materials that contain asbestos.
- Use a wet method in order to clean up asbestos materials.
- You may also use a vacuum that is equipped with a highly efficient filter that cleans particulate air.
- Use exhaust ventilation on permanent machining jobs.
- Wear an approved respirator if there is no other way to control the dust.
- Comply with applicable rules and regulations for the work place. In the USA, use Occupational Safety and Health Administration requirements. These OSHA requirements can be found in "29 CFR 1910.1001".

- Obey environmental rules for the disposal of asbestos and obey environmental regulations for the disposal of asbestos.
- Stay away from areas that might have asbestos particles in the air.

i00081360

Crushing Prevention and Cutting Prevention

SMCS Code: 7000

Support the equipment properly when you work beneath the equipment. Do not depend on the hydraulic cylinders to hold up the equipment. An attachment can fall if a control is moved, or if a hydraulic line breaks.

Unless you are instructed otherwise, never attempt adjustments while the machine is moving. Also, never attempt adjustments while the engine is running.

Whenever there are attachment linkages, the clearance in the linkage area will increase or the clearance in the linkage area will decrease with movement of the attachment.

Stay clear of all rotating parts and all moving parts.

Keep objects away from moving fan blades. The fan blade will throw objects or the fan blade will cut objects.

Do not use a kinked wire rope cable or a frayed wire rope cable. Wear gloves when you handle wire rope cable.

When you strike a retainer pin with force, the retainer pin can fly out. The loose retainer pin can injure personnel. Make sure that the area is clear of people when you strike a retainer pin.

In order to avoid injury to your eyes, wear protective glasses when you strike a retainer pin.

Chips or other debris can fly off objects when you strike the objects. Ensure that an injury will not occur from flying debris before you hit any object.

Rollover Protective Structure (ROPS) or Falling Objects Protective Structure (FOPS)

These guards are positioned above the operator's compartment and these guards are secured to the machine.

To avoid the possible weakening of the ROPS or of the FOPS, consult a Caterpillar dealer before you alter the guards. Do not alter the structure by welding, cutting, adding weight, or drilling holes into the structure.

Any alteration that is not specifically authorized by Caterpillar invalidates the Caterpillar certification for the ROPS and for the FOPS. The protection that is offered by the ROPS will be impaired if the ROPS has structural damage. Damage to the structure can be caused by an overturn, falling objects, etc.

Do not weld brackets to the ROPS and do not drill holes in the ROPS in order to mount fire extinguishers, first aid kits, and lights to the ROPS structure. Consult your Caterpillar dealer for mounting guidelines.

i01122451

Burn Prevention

SMCS Code: 7000

Coolant

At operating temperature, the engine coolant is hot and the engine coolant is under pressure. The radiator and all lines to the heaters or to the engine contain hot coolant or steam. Hot coolant or steam can cause severe burns. Do not allow hot coolant or steam to contact the skin.

Only check the coolant level after the engine has been stopped. Make sure that the radiator filler cap is cool. In order to remove the radiator cap with the bare hand, the radiator cap must be cool. In order to relieve pressure, remove the radiator filler cap slowly.

Cooling system additive contains alkali. Alkali can cause personal injury. Do not allow alkali to contact the skin, the eyes or the mouth.

Allow cooling system components to cool before you drain the cooling system.

Oils

Hot oil and hot components can cause personal injury. Do not allow hot oil to contact the skin. Also, do not allow hot components to contact the skin.

At operating temperature, the hydraulic tank is hot.

Remove the hydraulic tank filler cap only after the engine has been stopped. The filler cap must be cool enough to touch with a bare hand.

Remove the hydraulic tank filler cap slowly in order to relieve pressure.

Relieve all pressure in the air system, in the oil system, in the fuel system or in the cooling system. Relieve the pressure before any lines, any fittings or any related items are disconnected or removed.

Batteries

Batteries give off flammable fumes which can explode.

Do not smoke when you observe the battery electrolyte levels.

Electrolyte is an acid. Electrolyte can cause personal injury. Do not allow electrolyte to contact the skin or the eyes.

Always wear protective glasses when you work with batteries.

i00837742

Fire Prevention and Explosion Prevention

SMCS Code: 7000

WARNING

Dust created during repair of fenders and/or hood on this machine can be explosive. Refer to Special Instruction, REHS0034, "Guideline for Repair of Non-metallic Fenders and Hoods" before attempting any repair.

All fuels, most lubricants, and some coolant mixtures are flammable.

Fuel that is leaking, fuel that is spilled onto hot surfaces, and fuel that is spilled onto electrical components can cause a fire.

Do not smoke while you refuel or while you are in a refueling area.

Do not smoke in battery charging areas or in areas that are used to store flammable material.

Batteries can be installed in separate compartments. When you use jump start cables, always connect the positive "(+)" cable to the positive "(+)" terminal of the battery that is connected to the starter solenoid. Connect the negative "(-)" cable from the external source to the negative "(-)" terminal of the starter.

Note: If the starter is not equipped with a negative “(-)” terminal, connect the cable to the engine block.

See the Operation Section of this manual for specific starting instructions.

Clean all electrical connections and tighten all electrical connections. Check the electrical wires daily for loose wires or for frayed wires. Tighten all loose wires before you operate the machine. Repair all frayed wires before you operate the machine.

Store all fuels and lubricants in properly marked containers and away from all unauthorized persons.

Store all oily rags or other flammable material in a protective container.

Do not weld pipes that contain flammable fluids or tubes that contain flammable fluids. Do not flame cut pipes that contain flammable fluids or tubes that contain flammable fluids. Clean the pipes or tubes thoroughly with nonflammable solvent before you weld the pipes or tubes or you flame cut the pipes or tubes.

Remove all flammable materials (fuel, oil, debris, etc) before the flammable materials accumulate on the machine.

Do not expose the machine to flames or to brush that is burning.

Shields protect hot exhaust components from oil spray or fuel spray. Make sure that the shields are installed correctly in case a line, a tube, or a seal fails.

Ether

Do not spray ether into an engine when you use thermal starting aid to start the engine. Ether is not used on this machine.

Ether is poisonous and flammable. Inhaling ether vapors can cause personal injury. Do not allow ether to contact your skin repeatedly. Use ether only in well ventilated areas. Do not store ether cylinders in living areas or in the operator's compartment.

Do not store ether cylinders in direct sunlight or at temperatures above 40°C (102°F). Discard ether cylinders in an approved place. Do not puncture ether cylinders. Do not burn ether cylinders. Keep ether cylinders out of the reach of unauthorized personnel.

Lines, Tubes and Hoses

Do not bend high pressure lines. Do not strike high pressure lines. Do not install bent lines, bent tubes, or bent hoses. Do not install damaged lines, damaged tubes, or damaged hoses.

Repair loose lines, loose tubes, and loose hoses. Repair damaged lines, damaged tubes, and damaged hoses. Leaks can cause fires. See your Caterpillar dealer for repair or for replacement parts.

Check lines, tubes and hoses carefully. Do not use your bare hand to check for leaks. Use a board or cardboard to check for leaks. See Operation and Maintenance Manual, “Fluid Penetration” for more details. Tighten all connections to the recommended torque.

Replace the parts if any of the following conditions are present:

- The end fittings are damaged or leaking.
- The outer covering is chafed or cut.
- The wire shield is exposed.
- The outer covering is ballooning locally.
- The flexible part of the hose is kinked or crushed.
- The armoring is embedded in the outer cover.
- The end fittings are displaced.

Make sure that all clamps, guards, and heat shields are installed correctly. This will help to prevent vibration, rubbing other parts and excessive heat.

i00980571

Fire Extinguisher Location

SMCS Code: 7000; 7419

Make sure that a fire extinguisher is on the machine. Make sure that you are familiar with the operation of the fire extinguisher. Inspect the fire extinguisher and service the extinguisher. Obey the recommendations on the instruction plate.

Mount the fire extinguisher in the battery box. Do not weld the ROPS in order to install the fire extinguisher. Also, do not drill holes in the ROPS in order to mount the fire extinguisher on the ROPS.

i01122596

Electrical Storm Injury Prevention

SMCS Code: 7000

When lightning is striking in the vicinity of the machine, the operator should never attempt the following procedures:

- Mount the machine.
- Dismount the machine.

If you are in the operator's station during an electrical storm, stay in the operator's station. If you are on the ground during an electrical storm, stay away from the vicinity of the machine.

i00037330

Tire Information

SMCS Code: 4203

Explosions of air inflated tires have resulted from heat-induced gas combustion inside the tires. The heat that is generated by welding, by the heating of rim components, by an external fire, or by excessive use of the brakes can cause gaseous combustion.

A tire explosion is much more violent than a blowout. The explosion can propel the tire, the rim and the axle components as far as 500 m (1500 ft) or more from the machine. Both the force of the explosion and the flying debris can cause property damage, personal injury, or death.

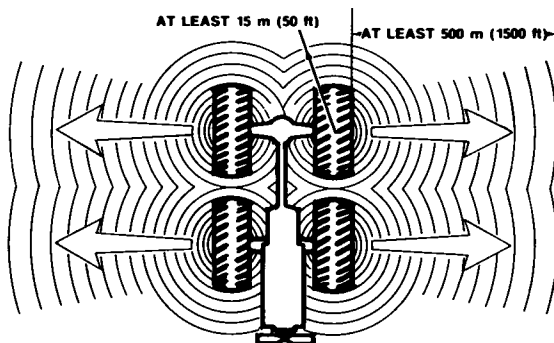


Illustration 15

g00037336

Do not approach a warm tire. Maintain a minimum distance that is shown in the illustration. Stay to the outside of the shaded area.

Dry nitrogen gas is recommended for inflation of tires. If the tires were originally inflated with air, nitrogen is still preferred for adjusting the pressure. Nitrogen mixes properly with air.

Nitrogen inflated tires reduce the potential of a tire explosion because nitrogen does not aid combustion. Nitrogen helps to prevent oxidation of the rubber. Nitrogen also prevents the deterioration of rubber and corrosion of rim components.

Proper nitrogen inflation equipment and training in the proper usage of the equipment are necessary in order to avoid overinflation. A tire blowout or a rim failure can result from improper equipment or from misused equipment.

When you inflate a tire, stand behind the tread and use a self-attaching chuck.

Servicing of tires and rims and changing of tires and rims can be dangerous. Only trained personnel that use proper tools and proper procedures should perform this work. If correct procedures are not used to service tires and rims, the assemblies could burst with explosive force. This explosive force can cause serious personal injury or death. Carefully obey the specific instructions from your tire dealer.

i00057874

Mounting and Dismounting

SMCS Code: 7000

- Get on the machine only at locations that are equipped with steps and/or handholds. Get off the machine only at locations that are equipped with steps and/or handholds.
- Before you get on the machine, clean the steps and the handholds. Inspect the stairs and the handholds. Make all necessary repairs.



Illustration 16

g00037367

- Face the machine whenever you get on the machine and whenever you get off the machine.

- Maintain a three-point contact with the steps and handholds.

Note: Three-point contact can be two feet and one hand. Three-point contact can also be one foot and two hands.

- Do not get on a moving machine. Do not get off a moving machine.
- Never jump off the machine.
- Do not try to get on the machine if you are carrying tools or supplies. Do not try to get off the machine if you are carrying tools or supplies. Use a hand line to pull equipment onto the platform.
- Do not use any controls as handholds when you enter the operator's compartment or when you exit the operator's compartment.

Alternate Exit

Machines that are equipped with cabs have alternate exits. For additional information, see Operation and Maintenance Manual, "Alternate Exit".

i00771840

Before Starting Engine

SMCS Code: 1000; 7000

Start the engine only from the operator compartment. Never short across the starter terminals or across the batteries. Shorting could damage the electrical system by bypassing the engine neutral start system.

Inspect the condition of the seat belt and of the mounting hardware. Replace any parts that are worn or damaged. Regardless of appearance, replace the seat belt after three years of use. Do not use a seat belt extension on a retractable seat belt.

Adjust the seat so that full pedal travel can be achieved with the operator's back against the back of the seat.

Make sure that the machine is equipped with a lighting system that is adequate for the job conditions. Make sure that all machine lights are working properly.

Before you start the engine and before you move the machine, make sure that no one is underneath the machine, around the machine, or on the machine. Make sure that the area is free of personnel.

i00080826

Before Starting Engine

SMCS Code: 1000; 7000

Start the engine only from the operator's compartment. Never short across the starter terminals or across the batteries. Shorting could bypass the engine neutral start system. Shorting could also damage the electrical system.

Inspect the condition of the seat belt and the condition of mounting hardware. Replace any damaged parts or worn parts. Regardless of appearance, replace the seat belt after three years of use. Do not use an extension for a seat belt on a retractable seat belt.

Adjust the seat so that full pedal travel can be achieved. Make sure that the operator's back is against the back of the seat.

Make sure that the machine is equipped with a lighting system that is adequate for the job conditions. Ensure that all lights are in proper working condition.

Make sure that there are no personnel in the area before you start the engine. Make sure that there are no personnel in the area before you move the machine. Make sure that there are no personnel on the machine, underneath the machine, or around the machine.

i00663584

Engine Starting

SMCS Code: 1000; 7000

If a warning tag is attached to the start switch or to the controls, do not start the engine. Also, do not move any controls.

Move all hydraulic controls to the HOLD position before you start the engine.

Move the transmission direction control lever to the NEUTRAL position.

Engage the parking brake.

Diesel engine exhaust contains products of combustion which can be harmful to your health. Always start the engine in a well ventilated area. Always operate the engine in a well ventilated area. If you are in an enclosed area, vent the exhaust to the outside.

i00080809

Before Operating Machine

SMCS Code: 7000

Clear all personnel from the machine and from the area.

Clear all obstacles from the path of the machine. Beware of hazards such as electrical wires, ditches, etc.

The stabilizers must be in the correct position before you operate the machine. Completely raise the stabilizers for transporting the machine or for loader operation. Lower the stabilizers before you operate the backhoe. **DO NOT DIG UNDER THE STABILIZERS!**

Stand outside of the machine on the ground in order to reposition the flip-over stabilizer pads. **DO NOT REPOSITION THE STABILIZER PADS WHILE YOU ARE IN THE CAB!**

Make sure that all windows are clean. Secure the doors in the open position or in the shut position. Secure the windows in the open position or in the shut position.

For the best visibility of the area that is close to the machine, adjust the rearview mirrors (if equipped).

Make sure that the machine horn, the backup alarm (if equipped) and all other warning devices are working properly.

Fasten the seat belt securely.

i00611452

Machine Operation

SMCS Code: 7000

WARNING

Always engage the parking brake and transmission neutral lock before dismounting the machine, operating the backhoe or engaging the boom lock for the transport position. Failure to do so could allow unexpected machine movement, resulting in personal injury or death.

When you operate the backhoe, engage the parking brake. Also, place the transmission in NEUTRAL and engage the transmission neutral lock.

Only operate the machine while you are in a seat. The seat belt must be fastened while you operate the machine. Only operate the controls while the engine is running.

While you operate the machine slowly in an open area, check for proper operation of all controls and all protective devices.

Before you move the machine, ensure that no one will be endangered.

Do not allow riders on the machine unless the machine has the following equipment:

- additional seat
- additional seat belt
- Rollover Protective Structure (ROPS)

Note any needed repairs during machine operation. Report any needed repairs.

Carry attachments approximately 40 cm (15 inches) above ground level. Do not go close to the edge of a cliff, an excavation, or an overhang.

If the machine begins to sideslip downward on a grade, immediately remove the load and turn the machine downhill.

Avoid any conditions that can lead to tipping the machine. The machine can tip when you work on hills, on banks and on slopes. Also, the machine can tip when you cross ditches, ridges or other unexpected obstacles.

Avoid operating the machine across the slope. When possible, operate the machine up the slopes and down the slopes.

Maintain control of the machine. Do not overload the machine beyond the machine capacity.

Be sure that the hitches and the towing devices are adequate.

Only connect the trailing equipment to a drawbar or to a hitch.

Never straddle a wire rope cable. Never allow other personnel to straddle a wire rope cable.

Before you maneuver the machine, make sure that no personnel are between the machine and the trailing equipment. Block up the hitch of the trailing equipment in order to align the hitch with the drawbar. Maneuver the machine. Connect the machine to the trailing equipment.

Know the maximum dimensions of your machine.

Always keep the Rollover Protective Structure (ROPS) installed during machine operation.

When you are roading an All Wheel Steer (AWS) machine, OPERATE IN FRONT WHEEL STEER MODE ONLY.

When you change steering modes, make sure that the front wheels and the rear wheels are centered.

Observe any local government regulations when you use the backhoe loader to lift heavy objects. Those regulations must be followed including any required machine modifications.

i00611454

Machine Parking

SMCS Code: 7000

Park on a level surface. If you must park on a grade, chock the machine.

Apply the service brake in order to stop the machine. Move the transmission control lever to the NEUTRAL position.

Move the speed control lever to the LOW IDLE position.

Engage the parking brake.

Engage the transmission neutral lock.

Lower all attachments to the ground.

Stop the engine.

Turn the engine start switch key to OFF position and remove the key.

Move the hydraulic control levers back and forth in order to relieve hydraulic pressure.

Move the hydraulic control levers to the HOLD position.

i01140378

Equipment Lowering with Engine Stopped

SMCS Code: 7000

Lowering the Loader Bucket

WARNING

Personal injury or death can result from a bucket falling.

Keep personnel away from the front of the machine when lowering the bucket.

The control valve (if equipped) is used to hold the lift arms in place in case of a hose failure in the lift circuit.

Two lift load control valves are used. One lift load control valve is located on each lift cylinder.

If there is a loss of hydraulic power, perform the following procedure to lower the lift arms to the ground.

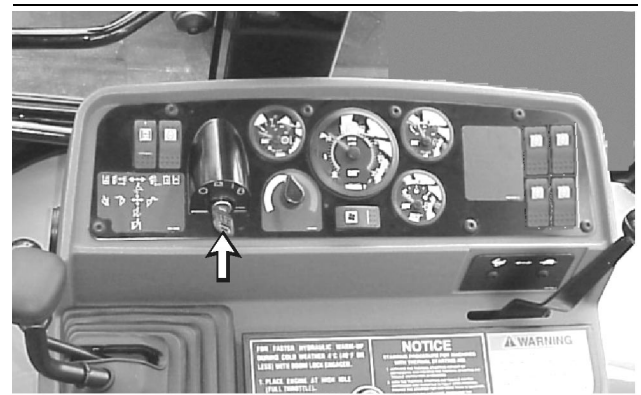


Illustration 17

g00604048

1. Turn the engine start switch key to the ON position.

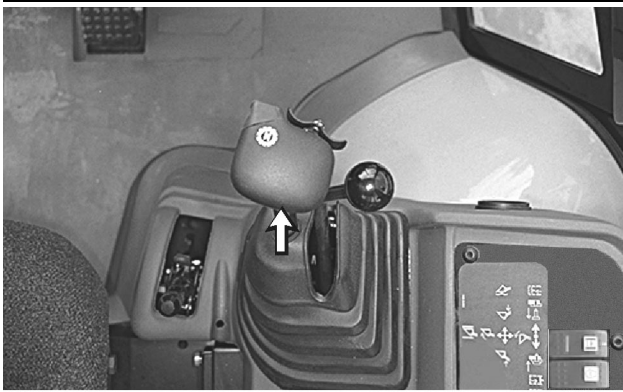


Illustration 18

g00633473

2. Slowly tap the loader control lever into the FLOAT position in order to lower the bucket to the ground.

Lowering the Boom

WARNING

Personal injury or death can result from the boom falling.

Keep personnel away from the rear of the machine when lowering the boom.

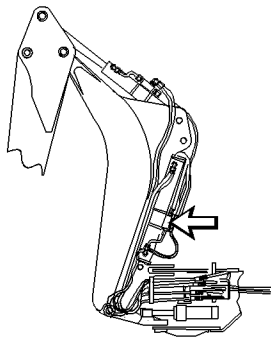


Illustration 19

g00287734

The boom load control valve (if equipped) is located on the boom cylinder.

The boom load control valve is used to hold the boom in place in case of a hose failure in the boom circuit.

To lower the boom to the ground, perform the following procedure.

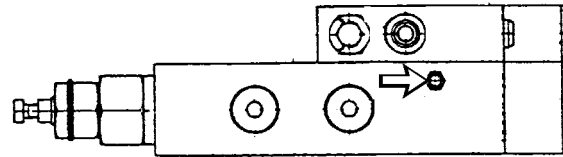


Illustration 20

g00514917

1. Install a 6 mm (0.25 inch) hose onto the purging screw. Route the other end of the hose into a suitable container in order to drain the oil.
2. Loosen the purging screw slightly and allow the oil to drain until the boom lowers to the ground. Tighten the purging screw after the boom is on the ground.

i00991941

Sound Information and Vibration Information

SMCS Code: 7000

Sound Level for Enclosed Cab

The operator sound pressure levels for the Backhoe Loader are measured at the recommended operating engine speed of 2100 rpm.

The operator sound exposure Leq (equivalent sound pressure level) measured according to the work cycle procedures specified in "ANSI/SAE J1166May90" is 79 dB(A), for the cab offered by Caterpillar, when properly installed and maintained and tested with the doors and windows closed.

The operator sound pressure level measured according to the procedures specified in "SAE J919Jun86" is 80 dB(A), for the cab offered by Caterpillar, when properly installed and maintained and tested with the doors and windows closed and with the machine in middle gear range and moving.

The exterior sound pressure level for the standard machine measured at a distance of 15 m (49.2 ft) according to the test procedures specified in "SAE J88Jun86", with the machine in middle gear range and moving, is 73 dB(A).

Sound Performance for Machines Offered in European Union Countries and in Countries that Adopt the EU Directives

Table 1

SOUND LEVELS				
Model	Machines without A/C		Machines with A/C	
	With Fan ⁽³⁾	Without Fan	With Fan	Without Fan
416C (NA) ⁽¹⁾ , 428C (NA)	82 dB(A)	80 dB(A)	84 dB(A)	83 dB(A)
416C (T) ⁽²⁾ , 428C (T), 426C	82 dB(A)	81 dB(A)	84 dB(A)	83 dB(A)
436C, 438C	82 dB(A)	81 dB(A)	84 dB(A)	83 dB(A)

⁽³⁾ Circulation Fan

⁽¹⁾ NA - Naturally Aspirated

⁽²⁾ (T) - Turbocharged

The operator sound pressure level is measured according to dynamic test procedures and conditions specified in "ISO 6396" or "95/27/EC". The operator sound pressure level is measured at the recommended operating engine speed of 2100 rpm.

As manufactured by Caterpillar, this machine's exterior sound power level meets the criteria specified in the European Directives noted on the certificate of conformance and the accompanying labels.

Vibration Level

The hands and arms are exposed to a weighted root mean square acceleration that is less than 2.5 m/sec².

The whole body is exposed to a weighted root mean square acceleration that is less than 0.5 m/s².

Measurements are obtained on a representative machine using the procedures in the following standards:

- "ISO 2631/1"
- "ISO 5349"
- "SAE J1166"